

Hugh WARDEN

Machine Learning | Data Science | Statistics | Bioimage Analysis

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I am a PhD student at the Institute of Genetics and Cancer, part of the University of Edinburgh. I am very passionate about using my background in machine learning, data science and statistics in a more applied setting, working with a wide range of geneticists and biologists to solve real world problems. Some details of my work may have been omitted if they pertain to unpublished research.

EDUCATION

August 2025 April 2022	PhD Genetics, KHAMSEH LAB - INSTITUTE OF GENETICS AND CANCER, University of Edinburgh I am currently studying for my PhD with the Khamseh Lab at the Institute of Genetics and Cancer. I am using machine learning to help gain a deeper learning of cellular morphology. We are currently working on the shift from aggregate to single cell morphological profiling and the computational/mathematical pipelines involved in this. I am then taking this further and applying it to cancer diagnosis in liver pathology slides. Machine Learning Cell Painting Bioimage Analysis R Python Julia Nextflow
March 2022 January 2022	Rotation Project, KUDLA LAB - INSTITUTE OF GENETICS AND CANCER, University of Edinburgh I completed a 3 month rotation under the supervision of Grzegorz Kudla and Diego Oyarzún using machine learning to investigate the transcriptomic and morphological effects of certain mutations. As well as producing the computational pipelines for analysis, I also got hands on with the wet lab work. As part of this rotation I spent a lot of time in the tissue culture lab observing how to look after cells, as well as looking after some of my own cells independently. Machine Learning R Python Cell Painting CellProfiler Genetics Cancer
December 2021 September 2021	Rotation Project, KHAMSEH LAB - INSTITUTE OF GENETICS AND CANCER, University of Edinburgh I spent 3 months working with Ava Khamseh producing a preprocessing pipeline for whole slide images to curate labelled data sets for machine learning. I worked in QuPath to understand how tools could be used to select various parts of images based on their immunohistochemistry. I then pulled this pipeline out of the GUI and into a groovy script so that it could be run on multiple images via the command line. After this, I worked on writing all of the meta scripts needed to submit these analyses as a job on the high performance cluster for fast analysis. I am now continuing this work as part of my PhD. Bioimage Analysis QuPath Groovy Bash R Python Cancer Genetics
September 2016 August 2021	MMath Mathematics, UNIVERSITY OF SOUTHAMPTON, I graduated from my Integrated Master of Mathematics (MMath) at the University of Southampton with first class honours. I gained an insight into all areas of maths, however I leaned towards the statistical and computational tracks. In the last two years of my degree I focused my studies on machine learning, data science and hypergraph theory, specifically their applications in the analysis of biological systems. Machine Learning Data Science Statistics Hypergraph Theory R Python Java Maths Biology Genetics

</> PROGRAMMING LANGUAGES

R	● ● ● ● ●
Python	● ● ● ● ○
Groovy	● ● ● ○ ○
Julia	● ● ○ ○ ○
SQL	● ● ○ ○ ○
Java	● ● ○ ○ ○

</> FAMILIAR WITH

- > Version Control :
 - > Git
 - > GitHub/GitLab
- > Bash
- > Environment Managers :
 - > Conda
- > BioImage Analysis :
 - > QuPath
 - > CellProfiler
- > \LaTeX

PERSONAL INTERESTS

I am a keen trumpet player, having played for 18 years. On top of this I also play drums, piano, guitar, bass and trombone. I am a member of multiple bands playing anything from classical or baroque to jazz or show tunes. Over many years I have held multiple roles on the committees for my ensembles, gaining experience in organisation as well as event planning.



As well as participating in multiple ensembles, I also spent a lot of time organising music events. During my undergraduate studies I spent one year as the Performing Arts Music Representative, organising events for 17 ensembles. I also spent one year as the Performing Arts Officer chairing a committee overseeing the running of all 42 of the University's performing arts societies. For both of these years I was a Strategic Board Member for the Turner Sims Concert Hall.


I have played badminton for over 15 years. During my undergraduate studies I was a member of the Recreational Badminton Society (one year of which I was treasurer) including travelling to and participating in multiple International Student Badminton Tournaments.

PERSONAL PROJECT EXAMPLES

RHYPE : A PACKAGE FOR WORKING WITH HYPERGRAPHS IN R

2021 - PRESENT

 <https://www.hwarden.com/project/rhype/working-with-hypergraphs-in-r-using-rhype/>  github.com/hwarden162/rhype
I built my own R package for working with hypergraphs in R. It has multiple functions to turn data structures into an R6 hypergraph environment and then multiple functions for manipulating and analysing the hypergraph object. It is currently available to install from CRAN and the development version is available from GitHub.

CREATING DIGITAL TEXT ART USING JAVASCRIPT

MARCH 2022

 <https://www.hwarden.com/project/creating-text-art-using-javascript/>

I used the p5.js JavaScript library and some of my own cell painting photos to create a striking cover photo for an upcoming presentation.

USING NLP TO CLASSIFY GENES AS GOF/LOF FROM PUBMED ARTICLES











JUNE 2022

 [Initial Blog Post](#)  github.com/hwarden162/mutation_nlp

I used Python to gather abstracts from PubMed articles referencing known gain of function or loss of function (GOF/LOF) genes. After this, I used various techniques in R to analyse these abstracts to tell the difference between ones referencing GOF and LOF genes.

TEACHING EXPERIENCE

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| August 2022 | Software Carpentry Instructor Qualification, SOFTWARE CARPENTRIES, The Carpentries
I achieved my instructor training certificate with the Software Carpentries having been trained in pedagogy with a focus on creating a motivating and engaging environment for learners.
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| Present
April 2022 | Workshop Instructor and Helper, Ed-DASH, University of Edinburgh
I work as a workshop instructor and helper for Ed-DaSh who teach software and data skills to other researchers. I am on the team teaching the Introduction to Statistics, High Dimensional Statistics and Introduction to Machine Learning in Python courses. On top of this I have contributed to and help improve the teaching materials for each of these courses.
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| Present
August 2022 | Workshop Helper, RESEARCH SOFTWARE ENGINEERING DEPARTMENT, University of Southampton
I help instruct the Introduction to R course for the researchers at the University of Southampton.
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REFERENCES

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